

**REMARKS**

The Office Action of September 27, 2005, the Notice of Non-Compliant Amendment dated December 7, 2005, and the Notice of Non-Compliant Amendment dated March 3, 2006 have been received and carefully reviewed. Applicant submits this amendment in response to the Notices of December 7, 2005, March 3, 2006, and the Office Action of September 27, 2005, with the previously withdrawn claims 31 and 32 being cancelled without prejudice or disclaimer and being identified using appropriate status identifiers (cancelled), and the above amendment also corrects the status identifier of claim 20 to "currently amended" in accordance with 37 CFR § 1.121, whereby entry of this amendment is respectfully requested. Applicant has also included the attached Declaration of the inventor Donna M. Walker dated November 15, 2005, as well as a Supplemental Declaration of the inventor Donna M. Walker dated April 3, 2006 together with this amendment, and notes that a copy of the November 15, 2005 declaration was submitted with the non-entered amendment referred to in the Notice of December 7, 2005, and with the response filed on December 14, 2005, whereby entry and consideration of the above amendment and the attached declarations is requested.

In response to the Office Action, claims 31, 32, and 34 have been cancelled without prejudice or disclaimer, claims 1, 2, 11, 15-20, 22, 24, 29, and 30 have been amended, and new claims 35-39 have been added. Applicant notes the Examiner's helpful explanation of the rejections under 35 U.S.C. §112 in a telephonic interview on October 12, 2005, conducted with the Examiner and Applicant's attorney Eric Highman. The discussion included proposals on claim amendments to address the rejections under 35 U.S.C. §112, as well as a discussion of the cited reference Igsu 4,001,053 and independent claim 1 of the application, wherein no agreement was reached on specific claim language. The Examiner requested that Applicant submit evidence of the acceleration advantages of the invention through a declaration under 37. CFR 1.132, and Applicant's attorney agreed, wherein the requested declaration and test data are provided with this response. Reconsideration of the pending claims 1-30, 33, and 35-39 is respectfully requested in view of the above amendments, the attached declaration of Donna M. Walker, and the following remarks.

**I. REJECTION OF CLAIMS 1-30, 33, AND 34 UNDER 35 U.S.C. §112**

Claims 1-30, 33, and 34 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failure to particularly point out and distinctly claim the subject matter regarded as the invention. In particular, the Office Action asserted that the usage of the word “type” in claims 1, 2, 11, 15-19, 22, 24, 29, and 30 is indefinite, citing to Ex parte Copenhaver, 109 USPQ 118 (Bd. Pat. App. & Int. 1956). In addition, the Office Action states that the meaning of “a time less than the time required to cool the part to room temperature” in claim 34 is unclear. Reconsideration and withdrawal of these claim rejections is respectfully requested for at least the following reasons.

**A      USAGE OF “TYPE”**

Applicant notes at the outset that claims 20 and 21 do not include the term “type” or variants thereof, and furthermore do not depend from claims that use the word “type”. Therefore, Applicant assumes the rejection of claims 20 and 21 in the Office Action under 35 U.S.C. §112 was in error, and respectfully requests reconsideration and withdrawal of the rejections of these claims under 35 U.S.C. §112, second paragraph.

Regarding claims 1-19, 20-30, 33, and 34, the Office Action cited to Ex parte Copenhaver in support of the assertion that the usage of the work “type” in the claims renders the present claims indefinite. By the above amendment, claims 1, 2, 11, 15-19, 22, 24, 29, and 30 have been amended to remove the words “type” and “types” to address the rejections under 35 U.S.C. §112. Applicant notes that the claims have not been narrowed by this amendment, which is made merely to clarify the claims with respect to the rejection in the Office Action. In this regard, Applicant submits that those skilled in the art would understand the scope of the present claims when read in light of the specification. In particular, upon reading the specification, it is clear that the claims refer to application of multiple energy types or forms, wherein the specification is replete with examples of various energy types, including but not limited to thermal energy forms, oscillatory energy forms, etc. Moreover, Applicant has amended claim 1 above to recite that the first and second energies are different, wherein this amendment does not narrow the scope of the claims. Applicant therefore believes the claims are definite and respectfully requests reconsideration and withdrawal of the rejections of pending claims 1-30, and 33 under 35 U.S.C. §112, second paragraph.

**B CLAIM 34**

Claim 34 was rejected as indefinite under 35 U.S.C. §112, second paragraph. By the above amendment, this claim has been cancelled without prejudice or disclaimer, whereby the rejection has been rendered moot at this point.

**C NEW CLAIMS 35-39**

Applicant also submits that new claims 35-39 are definite within the meaning of 35 U.S.C. §112, second paragraph, wherein these claims do not use the term “type”, whereby examination thereof is respectfully requested.

**II. REJECTION OF CLAIMS 1- 30 AND 33-34 UNDER 35 U.S.C. §103**

Claims 1-30, 33, and 34 were rejected under 35 U.S.C. §103 as being obvious in view of U.S. Patent No. 4,001,053 to Igisu. As discussed above, claim 34 has been cancelled without prejudice by the above amendment. Applicant submits that claims 1-30 and 33, as amended above, are patentably distinct from Igisu, and further that new claims 35-39 are non-obvious in view of Igisu, as set forth in greater detail below.

A *prima facie* case of obviousness requires some suggestion or motivation in the references, the nature of the problem to be solved, or in the knowledge generally available to one skilled in the art to modify a reference or to combine references. SEE MPEP § 2143.01, citing to *In re Kotzab*, 55 USPQ2d 1313 (Fed. Cir. 2000); *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). Moreover, the showing of such suggestion or motivation must be clear and particular, rather than based on conclusory rationale. SEE *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002); *In re Dembiczak*, 50 USPQ2d 1614 (Fed. Cir. 1999). Furthermore, the motivation or suggestion must be with respect to the particular manner claimed, *Kotzab*; *In re Rouffet*, 47 USPQ2d 1453 (Fed. Cir. 1998). Applicant submits that Igisu fails to teach or suggest all the elements of the rejected claims, and respectfully requests reconsideration and withdrawal of these claim rejections under 35 U.S.C. §103 for at least the following reasons. Furthermore, Applicant submits that a *prima facie* case of obviousness has not been established, as there is no indication of a proposed modification of Igisu to address the elements of the

claims that are not taught in the reference, in particular, the claimed concurrent application of multiple energy types.

**A IGISU FAILS TO TEACH OR SUGGEST CONCURRENT APPLICATION OF MULTIPLE ENERGY FORMS**

As amended above, independent claim 1 and dependent claims 2-17 and 33 involve methods for changing a physical property of a structure through concurrent application of multiple energy forms. In this regard, independent claim 1 recites that the first and second energy processes are performed concurrently for at least the time value. In addition, independent claim 18 and dependent claim 19 relate to a method of changing a physical property of a structure, wherein independent claim 18 recites first and second energy processes performed concurrently for at least a time value. Moreover, independent claim 20 and dependent claim 21 are directed to methods for stress-relieving a structure, which include providing thermal energy to the structure and concurrently providing oscillatory energy to the structure.

Igisu does not teach concurrent application of multiple energy types or forms. Rather, the examples of Igisu appear to be limited to application of only one energy type. In this regard, Examples 1-14, and 20-22 appear to involve vibration without concurrent application of thermal energy, whereas Examples 15-19 are thermal treatments with no vibration. Importantly, none of these examples appears to concurrently provide both treatment types, whereby these techniques of Igisu fail to teach all the recited elements of methods of claims 1-19 and 33. Moreover, there is no suggestion to modify Igisu to arrive at the claimed invention.

The Office Action cites specifically to Igisu col. 1, lines 5-54, as referring to three methods (vibration method, heating method, and seasoning method). The cited passage, however, merely refers to three known techniques for removing residual stress of a work formed of metal or ceramic, and does not suggest that the three techniques are combinable. Moreover, the invention of Igisu appears to involve two separate techniques, the first being referred to as the vibration treatment or the percussion treatment, and the second called a heating treatment. SEE for example, col. 2, lines 13-16. These two techniques are treated throughout Igisu as alternatives, but are not indicated as being performed concurrently. The Office Action also refers to Igisu Examples 1-6 in col. 10, stating that Igisu discloses residual stress reduction by

vibration at normal temperature. These Examples 1-6, however, do not teach or suggest concurrently applying two energy types or forms. Rather, Examples 1-6 of Igsu appear to be vibration (percussion) treatments without concurrent performance of a thermal energy process.

The Office Action also refers to Examples 13 and 14 in col. 13 of Igsu. Example 13 of Igsu states:

A ring of 39mm outer diameter, 31mm inner diameter and 8mm thickness formed of stainless steel was **induction-hardened**, and *then* subject to the **percussion treatment** for 30 minutes with 9G exciting force and 30Hz frequency of the vibrator. The result was that -0.539mm strain before the vibration was reduced to -0.143mm thereafter, therefore the value of removed strain being 0.396mm.

(Igsu, col. 13, lines 28-35, emphasis added). As is clearly seen by the highlighted portion above, and as acknowledged in the Office Action at page 3, the ring was induction hardened (heated and quenched) *and then* subjected to the percussion treatment. This Example 13, therefore, does not teach or suggest *concurrent* application of multiple energy types.

The same is true of Example 14 cited in the Office Action, which provides:

A ring of 39mm outer diameter, 31mm inner diameter and 8mm thickness formed of carbon steel including 0.45% of carbon was **induction-hardened**, and *then* subject to the **percussion treatment** for 30 minutes with 9G exciting force and 30Hz frequency of the vibrator. The result was that +0.040 strain measured before the vibration was reduced to -0.013mm thereafter, therefore the value of the removed strain being 0.053mm.

(Igsu, col. 13, lines 38-45, emphasis added). Thus, just like Example 13 above, Example 14 of Igsu also fails to teach or suggest concurrent application of multiple energy forms. Moreover, there appears to be no motivation, suggestion, nor reasonable expectation of success for modifying the teachings of Igsu in the manner set forth in these claims. Rather, the teachings of Igsu appear to be silent with respect to combining different energy processes concurrently. Therefore, the teachings of Igsu

do not address the recitations in independent claims 1, 18, and 20 that first and second energy processes are performed concurrently, and there is no suggestion in Igsu for the invention as claimed. For at least this reason, Applicant therefore requests reconsideration and withdrawal of the rejection of claims 1-21 and 33 under 35 U.S.C. §103.

**B** **IGISU FAILS TO TEACH OR SUGGEST THE CLAIMED SELECTION AND DETERMINATION OF OPERATIONAL SETTINGS AND TIME VALUES FOR APPLICATION OF MULTIPLE ENERGY FORMS TO A STRUCTURE**

Independent claim 1 and the corresponding dependent claims 2-19 and 33 include providing energy of a first energy form to a structure by performing a first energy process according to an operational setting, in which at least one of the operational setting and a time value are selected according to a first order rate relationship for the first energy process, according to a first order rate relationship for a second energy process, and according to a desired physical property value. Independent claim 18 and dependent claim 19 also involve methods in which one of the operational setting and the time value are selected according to a desired physical property value and according to a first order rate relationship that relates concurrent application of the first and second energy forms to the structure and a physical property of the structure. Claims 20 and 21 include selecting a first one of a temperature setting and a time value, and selecting a second one of the temperature setting and the time value according to a third Larson Miller parameter, according to a first Larson Miller relationship, and according to the first one of the temperature setting and the time value. Igsu appears to be silent regarding selection of the operational parameters and time value in the manner set forth in the claims, and does not appear to reference first order rate relationships. For this additional reason, claims 1-21 and 33 are patentably distinct from Igsu and the other art of record, and Applicant requests reconsideration and withdrawal of the rejections thereof under 35 U.S.C. §103.

Independent claim 22 and dependent claims 23-28 are directed to determining operational settings and time values for concurrent application of multiple energy types to a structure, in which first and second parameters are determined according to first order rate relationships for two different energy processes. In addition, these methods include selecting a first one of a time value and an operational setting for the first

energy process, and selecting a second one of the time value and the operational setting according to the first and second parameters, according to the first order rate relationship for the first energy process, and according to the first one of the time value and the operational setting. Furthermore, claims 29 and 30 involve methods for determining operational settings for concurrent application of multiple energy forms, wherein independent claim 29 recites selecting a second one of an operational setting and a time value according to a first order rate parameter, according to a first order rate relationship, and according to the first one of the operational setting and the time value. In contrast, the teachings of Igsu do not involve concurrent application of multiple energy processes, and Igsu teaches nothing with respect to selection of operational settings and time values for multiple concurrent energy processes. Consequently, Igsu fails to render these claims obvious, and Applicant requests reconsideration and withdrawal of the rejections of claims 22-30 under 35 U.S.C. §103.

Applicant further notes that other art of record provides for concurrent heating and vibration, such as Brown 3,999,276, Seror 5,252,152, and Unde 6,223,974. However, these references appear silent with respect to determining operational settings for concurrent application of multiple energy types according to first order rate relationships, and are also silent with regard to providing a desired amount of stress reduction in accelerated fashion by the techniques specified in the claims. Therefore, the pending claims are also believed to be patentably distinct from Brown 3,999,276, Seror 5,252,152, and Unde 6,223,974, alone or in combination, as these references provide no teaching or suggestion for the methods set forth in the claims.

### **C      NEW CLAIMS 35-39**

Independent claim 35 is directed to a method for stress relieving a structure, in which first and second processes are performed concurrently to provide different first and second forms of energy to a structure. As discussed above, Igsu does not teach or suggest concurrent application of multiple energy types. In addition, the first and second energy processes are performed in claims 35-39 above an activation energy for the material of the structure. Furthermore, the first and second energy levels and the time value are selected to accelerate stress reduction in claims 35-39. Applicant submits that Igsu and the other record art does not address acceleration of stress

reduction in the manner set forth in claims 35-39, and furthermore, does not provide two concurrent processes above the activation energy. In addition, dependent claim 37 recites that the time value and one of the energy levels are selected according to first order rate relationships that relate application of the first and second forms of energy to the structure and a desired amount of stress reduction. Base on the above discussion, Applicant therefore submits that claims 35-39 are also patentably distinct from Igisu, and respectfully requests examination thereof.

**III. DECLARATION OF NOVEMBER 15, 2005 UNDER 37 CFR § 1.132**

Attached hereto is a declaration of the inventor Donna M. Walker, showing the accelerated stress reduction advantages of the present invention. As shown in the comparative test results of EXHIBIT A, the amount of stress removed by the concurrent application of the thermal and vibratory energy for a total time of 120 seconds exceeds the stress reduction through separate application of the same thermal energy level for 120 seconds followed by the same vibratory energy applied for 120 seconds. Thus, the declaration shows that the property change is accelerated by use of the concurrent multiple energy type application features of the invention, thereby achieving unexpected results that are clearly neither taught nor suggested in Igisu or the other art of record.

**IV. DECLARATION OF APRIL 4, 2006 UNDER 37 CFR § 1.132**

Attached hereto is a Supplemental Declaration of the inventor Donna M. Walker dated April 3, 1006, in response to the Office Communication mailed March 3, 2006. The Office Communication states that the November 15, 2005 Declaration does not disclose the conditions of "#1 Rolled- baseline" sample such as hot/cold rolled and % reduction, and asks whether the first and second steel samples were also rolled in the same condition as "rolled-baseline". As attested in the attached supplemental declaration, all specimens were sectioned from a single plate of cold-rolled steel, and the cooling technique used in the sequential processing of the first steel sample is believed to be the cause of the first steel sample having higher residual stress than baseline sample. The attached supplemental declaration is believed to answer the questions of the Examiner, and the results of the November 15, 2005 declaration show



the accelerated stress reduction advantages of the present invention, wherein the property change is accelerated by use of the concurrent multiple energy type application features of the invention, thereby achieving unexpected results that are clearly neither taught nor suggested in Iqisu or the other art of record. Applicant therefore requests reconsideration and allowance of pending claims 1-30, 33, and 35-39.

**CONCLUSION**

In response to the Office Action, claims 1, 2, 11, 15-20, 22, 24, 29, and 30 have been amended without narrowing the scope thereof, claims 31, 32, and 34 have been cancelled without prejudice or disclaimer, and new claims 35-39 have been added, whereby claims 1-30, 33, and 35-39 are currently pending. For at least the above reasons, the currently pending claims are believed to be in condition for allowance and notice thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any extensions of time be necessary by the filing of this response and any attached papers or any other paper associated with the prosecution of the above referenced application, such extensions of time are hereby requested and authorized and the Commissioner is hereby authorized to charge the Deposit Account Number 06-0308, DWHP200001 for any fees due as a result of the filing of this response or any other paper filed in association with the above referenced application.

Respectfully submitted,

FAY, SHARPE, FAGAN,  
MINNICH & McKEE, LLP

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Date

/Eric Highman/  
Eric Highman  
Reg. No. 43,672  
1100 Superior Avenue  
Seventh Floor  
Cleveland, Ohio 44114-2579  
216-861-5582